

WE CLAIM:

- 1 1. A circuit arrangement for sampling a logic data signal, comprising:
2 a first timer adapted to time a first time interval;
3 a delay timer coupled to the first timer and adapted to time a delay time interval
4 initiated from the start of the first time interval;
5 a second timer coupled to the delay timer and adapted to time a second time
6 interval initiated at the end of the delay time interval;
7 a coincidence circuit having an input terminal for receiving the logic data signal,
8 an output terminal, and an enable terminal coupled to the second timer, the coincidence
9 circuit adapted to pass a sample of digital event pulses comprising the logic data signal
10 from the input terminal to the output terminal during the second time interval.
- 1 2. The circuit arrangement of claim 1, wherein the first timer is a binary count
2 register having N+1 bits, the delay timer is a latch register having N bits, and the binary
3 count register and latch register are coupled to a comparator circuit, and the comparator
4 circuit adapted to initiate the second timer when the value of the binary count register and
5 the value of the latch register are equivalent.
- 1 3. The circuit arrangement of claim 2, wherein the delay timer is adapted to pseudo-
2 randomly vary the delay time interval.
- 1 4. The circuit arrangement of claim 3, wherein the delay timer is adapted to select the
2 delay time interval from a finite set of discrete times.
- 1 5. The circuit arrangement of claim 3, wherein the latch register is a latching shift
2 register.
- 1 6. The circuit arrangement of claim 5, further comprising a pseudo-random number
2 generator coupled to the latch register, the pseudo-random number generator having less
3 bits than the latch register and the pseudo-random number generator adapted to seed the
4 latch register.

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1 7. The circuit arrangement of claim 6, wherein the latching shift register is a round
2 robin latch.

1 8. The circuit arrangement of claim 7, wherein the second timer is a second binary
2 counter having $M+1$ bits, M being less than or equal to N .

1 9. The circuit arrangement of claim 8, wherein the first timer is adapted to time a
2 series of periodic first time intervals.

1 10. The circuit arrangement of claim 9, wherein the delay timer is adapted to
2 determine and time a new delay time interval for each first time interval in the series of
3 first time intervals.

1 11. The circuit arrangement of claim 10, further comprising a counting circuit coupled
2 to the output terminal of the coincidence circuit, the counting circuit adapted to
3 accumulate a count of the digital event pulses in the sample.

1 12. The circuit arrangement of claim 11, wherein the counting circuit is reset
2 responsive to the first timer.

1 13. A circuit arrangement for sampling a plurality of digital event pulses, comprising:
2 a first timer adapted to time a plurality of base time intervals;
3 a second timer adapted to generate a sampling window signal for a sampling
4 window time interval, the sampling window time interval being a shorter time than any of
5 the base time intervals;
6 a sample window initiate circuit coupled to the first timer and adapted to start the
7 second timer at a pseudo-random time within each of the plurality of base time intervals;
8 and
9 a sampler circuit coupled to the second timer and arranged to receive the plurality
10 of digital event pulses and to pass a sample of digital event pulses responsive to the
11 sampling window signal.

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1 14. The circuit arrangement of claim 13, further comprising a counting circuit coupled
2 to the sampler circuit, the counting circuit adapted to accumulate a count of the sample of
3 digital event pulses.

1 15. The circuit arrangement of claim 14, wherein the counting circuit is a digital
2 counter.

1 16. The circuit arrangement of claim 14, wherein the counting circuit further
2 comprises a capacitor coupled through a transistor to a constant current source, the
3 transistor being responsive to each of the digital event pulses to pass a substantially fixed
4 amount of charge from the constant current source to the capacitor.

1 17. The circuit arrangement of claim 15, wherein the first timer is a binary counter
2 having $N+1$ bits, and the second timer is a binary counter having $M+1$ bits, M being less
3 than or equal to N .

1 18. The circuit arrangement of claim 17, wherein the first and second timers are
2 adapted to count clock cycles, and the pseudo-random time being a discrete binary value
3 of first timer.

1 19. The circuit arrangement of claim 18, wherein the sampling window initiate circuit
2 comprises a pseudo-random number generator having K bits coupled to a shift register
3 having N bits, the shift register arranged to receive and shift binary pseudo-random
4 numbers from the pseudo-random number generator to form N bit pseudo-random
5 numbers, whereby K is less than or equal to N .

1 20. The circuit arrangement of claim 19, wherein the shift register is a round robin
2 latch.

1 21. The circuit arrangement of claim 20, wherein the overflow bit of the first timer is
2 coupled to the counting circuit, the counting circuit adapted to reset responsive to the
3 overflow bit of the first timer.

- 1 22. A method for sampling a logic data signal, comprising:
2 receiving a plurality of digital event pulses characterizing the logic data signal
3 during each of a series of base time intervals;
4 applying a sampling window signal for a sample window time interval beginning
5 at a pseudo-random time during each of a series of base time intervals;
6 selecting a subset of digital event pulses during application of the sampling
7 window signal; and
8 accumulating a count of the subset digital event pulses.
- 1 23. The method of claim 22, further comprising:
2 timing each base time interval with a base time binary counter, the base time
3 binary counter adapted to count clock cycles; and
4 timing the sample window time interval with a sample window binary counter, the
5 sample window binary counter adapted to count clock cycles.
- 1 24. The method of claim 23, further comprising:
2 seeding a round robin latch with a pseudo-random number generator, the round
3 robin latch having a length of N bits, the base time counter having a length of N+1 bits,
4 and the pseudo-random number generator having fewer bits than the round robin latch;
5 shifting round robin latch bit values and populating all bits of the round robin
6 latch;
7 forming an N bit pseudo-random number in the round robin latch; and
8 initiating timing of the sample window time interval when a value of the base time
9 binary counter is equivalent to a value of the round robin latch.
- 1 25. The method of claim 24, further comprising resetting the count of the subset of
2 digital event pulses accumulated at the end of each base time interval.
- 1 26. A circuit arrangement to sample a logic data signal, comprising:
2 means for receiving a plurality of digital event pulses characterizing the logic data
3 signal during each of a series of base time intervals;

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- 4 means for applying a sampling window signal for a sample window time interval
- 5 beginning at a pseudo-random time during each of a series of base time intervals;
- 6 means for selecting a subset of digital event pulses during application of the
- 7 sampling window signal; and
- 8 means for accumulating a count of the subset digital event pulses.